

was led to investigate the subject, and was then again conducted, by another road, to the same law of the inverse square of the distance. This naturally turned his thoughts to his former speculations. Was there really no way of explaining the discrepancy which this law gave, when he attempted to reduce the moon's motion to the action of gravity? A scientific operation then recently completed, gave the explanation at once. He had been mistaken in the magnitude of the earth, and consequently in the distance of the moon, which is determined by measurements of which the earth's radius is the base. He had taken the common estimate, current among geographers and seamen, that sixty English miles are contained in one degree of latitude. But Picard, in 1670, had measured the length of a certain portion of the meridian in France, with far greater accuracy than had yet been attained; and this measure enabled Newton to repeat his calculations with these amended data. We may imagine the strong curiosity which he must have felt as to the result of these calculations. His former conjecture was now found to agree with the phenomena to a remarkable degree of precision. This conclusion, thus coming after long doubts and delays, and falling in with the other results of mechanical calculation for the solar system, gave a stamp from that moment to his opinions, and through him to those of the whole philosophical world.

[2d Ed.] [Dr. Robison (*Mechanical Philosophy*, p. 288) says that Newton having become a member of the Royal Society, there learned the accurate measurement of the earth by Picard, differing very much from the estimation by which he had made his calculations in 1666. And M. Biot, in his *Life of Newton*, published in the *Biographie Universelle*, says, "According to conjecture, about the month of June, 1682, Newton being in London at a meeting of the Royal Society, mention was made of the new measure of a degree of the earth's surface, recently executed in France by Picard; and great praise was given to the care which had been employed in making this measure exact."

I had adopted this conjecture as a fact in my first edition; but it has been pointed out by Prof. Rigaud (*Historical Essay on the First Publication of the Principia*, 1838), that Picard's measurement was probably well known to the Fellows of the Royal Society as early as 1675, there being an account of the results of it given in the *Philosophical Transactions* for that year. Newton appears to have discovered the method of determining that a body might describe an ellipse when acted upon by a force residing in the focus, and varying